

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
5 August 2004 (05.08.2004)

PCT

(10) International Publication Number
WO 2004/065928 A3

(51) International Patent Classification⁷: C07K 17/00, G01N 33/68, C12N 11/00

(21) International Application Number: PCT/DK2004/000047

(22) International Filing Date: 22 January 2004 (22.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PA200300081 22 January 2003 (22.01.2003) DK
60/441,975 22 January 2003 (22.01.2003) US

(71) Applicant (for all designated States except US): BIONANOPHOTONICS A/S [DK/DK]; Bredgade 56, DK-1260 Copenhagen K (DK).

(72) Inventors; and

(75) Inventors/Applicants (for US only): PETERSEN, Steffen, Bjørn [DK/DK]; Kalmanparken 20 Frejlev, DK-9200 Aalborg (DK). DA CRUZ AUGUSTO NEVES PETERSEN, Maria, Teresa [PT/DK]; Kalmanparken 20 Frejlev, DK-9200 Aalborg (DK).

(74) Agent: ZACCO DENMARK A/S; Hans Bekkevolds Allé 7, DK-2900 Hellerup (DK).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
10 September 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/065928 A3

(54) Title: LIGHT INDUCED IMMOBILISATION

(57) Abstract: The present invention involves a method of coupling disulfide bridge containing proteins to a carrier by inducing the formation of thiol groups on a protein with irradiation, and coupling the protein to the carrier. The formation of thiol group(s) in the protein is a consequence of the disruption of disulfide bridges following electronic excitation of aromatic amino acid residues located in close spacial proximity to the disulfide bridge. The light-induced coupling method facilitates the orientated immobilization of a protein on a carrier.

INTERNATIONAL SEARCH REPORT

	International Application No PCT/DK2004/000047
--	---

	A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C07K17/00 G01N33/68 C12N11/00
--	---

According to International Patent Classification (IPC) or to both national classification and IPC	
---	--

	B. FIELDS SEARCHED
--	---------------------------

Minimum documentation searched (classification system followed by classification symbols) IPC 7 C07K G01N C12N	
---	--

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
---	--

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)	
--	--

EPO-Internal, WPI Data, BIOSIS, PAJ, CHEM ABS Data	
--	--

C. DOCUMENTS CONSIDERED TO BE RELEVANT	
---	--

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 91/16425 A (SIGRIST HANS ; KLINGLER DABRAL VIBHUTI (DE); DOLDER MAX (CH); WEGMU) 31 October 1991 (1991-10-31) cited in the application the entire document, in particular claims 1 to 6 and pages 2,3 and 5	1-27
X	WO 94/01773 A (BIOMIRA INC ; QI PEI (CA); SYKES THOMAS R (CA); WOO THOMAS K (CA); NOU) 20 January 1994 (1994-01-20) the entire document, in particular pages 1,11,19 and claim 1	1-27 -/-

<input checked="" type="checkbox"/>	Further documents are listed in the continuation of box C.
-------------------------------------	--

<input checked="" type="checkbox"/>	Patent family members are listed in annex.
-------------------------------------	--

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the International filing date
- *L* document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the International filing date but later than the priority date claimed

- *T* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the International search	Date of mailing of the International search report
---	--

13 July 2004	02.08.2004
--------------	------------

Name and mailing address of the ISA	Authorized officer
-------------------------------------	--------------------

European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Schmidt, Harald
---	-----------------

INTERNATIONAL SEARCH REPORT

International Application No
PCT/DK2004/000047

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	COLLIQUET A ET AL: "ORIENTED AND COVALENT IMMOBILIZATION OF TARGET MOLECULES TO SOLID SUPPORTS: SYNTHESIS AND APPLICATION OF A LIGHT-ACTIVATABLE AND THIOL-REACTIVE CROSS-LINKING REAGENT" BIOCONJUGATE CHEMISTRY, AMERICAN CHEMICAL SOCIETY, WASHINGTON, US, vol. 4, no. 6, 1993, pages 528-536, XP001121631 ISSN: 1043-1802 cited in the application abstract; figure 1 -----	1-27
X	NEVES-PETERSEN MT ET AL.: "High probability of disrupting a disulphide bridge mediated by an endogenous excited tryptophan residue" PROTEIN SCIENCE, vol. 11, 2002, pages 588-600, XP002288112 cited in the application the entire document, in particular section "Discussion" and the abstract -----	28, 29
A	US 6 350 368 B1 (WILMER I ET AL.) 26 February 2002 (2002-02-26) the whole document -----	
A	US 3 959 078 A (GUIRE PATRICK E) 25 May 1976 (1976-05-25) page 1 - page 2; claim 1 -----	
A	US 5 412 087 A (MCGALL GH ET AL) 2 May 1995 (1995-05-02) column 3; example 3 -----	
A	DOSE K: "The Photolysis of Free Cystine in the Presence of Aromatic Amino Acids" PHOTOCHEMISTRY AND PHOTOBIOLOGY, vol. 8, 1968, pages 331-335, XP008032773 the entire document, in particular page 331 and Figure 1 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2004/000047

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-27 (all completely)

methods of coupling a disulfide bridge containing protein or peptide to a carrier

2. claims: 28,29 (both completely)

method of predicting a disulfide bridge containing protein or peptide capable of disruption by irridiaton

INTERNATIONAL SEARCH REPORT

Information on patent family members

In tional Application No

PCT/DK2004/000047

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9116425	A	31-10-1991	AT 155524 T WO 9116425 A1 DE 59108783 D1 DK 484472 T3 EP 0484472 A1		15-08-1997 31-10-1991 21-08-1997 11-08-1997 13-05-1992
WO 9401773	A	20-01-1994	AT 160222 T AU 675235 B2 AU 4666893 A CA 2137561 A1 DE 69315213 D1 DE 69315213 T2 EP 0649532 A1 FI 950062 A JP 8505119 T NO 950037 A WO 9401773 A1 US 6313274 B1		15-11-1997 30-01-1997 31-01-1994 20-01-1994 18-12-1997 19-03-1998 26-04-1995 05-01-1995 04-06-1996 05-01-1995 20-01-1994 06-11-2001
US 6350368	B1	26-02-2002	IL 118432 A AT 257943 T AU 2786997 A DE 69727250 D1 EP 1002229 A1 WO 9745720 A1		31-12-1999 15-01-2004 05-01-1998 19-02-2004 24-05-2000 04-12-1997
US 3959078	A	25-05-1976	NONE		
US 5412087	A	02-05-1995	AT 262374 T AT 241426 T AU 675054 B2 AU 3148193 A AU 4110793 A CA 2124087 A1 CA 2348689 A1 CA 2389355 A1 DE 69233087 D1 DE 69233087 T2 DE 69233331 D1 EP 1086742 A1 EP 0624059 A1 EP 0916396 A2 EP 0972564 A2 HK 1025278 A1 JP 7506561 T JP 2003061657 A WO 9309668 A1 WO 9322680 A1 US 6040193 A US 2004092032 A1 US 6136269 A US 5677195 A		15-04-2004 15-06-2003 23-01-1997 15-06-1993 29-11-1993 27-05-1993 27-05-1993 27-05-1993 03-07-2003 24-12-2003 29-04-2004 28-03-2001 17-11-1994 19-05-1999 19-01-2000 03-10-2003 20-07-1995 04-03-2003 27-05-1993 11-11-1993 21-03-2000 13-05-2004 24-10-2000 14-10-1997